Iowa Department of Natural Resources
Environmental Protection Commission

ITEM **6** **DECISION**

TOPIC **Contract – Iowa State University – Wetland Biological Monitoring**

The Department requests Commission approval of a $34,261 contract with Dr. Tim Stewart to develop indicators of biological integrity for Iowa's wetlands.

This contract begins a new, two year project to develop indicators of biological integrity for Iowa's wetland ecosystems. The primary objective of this study is to use macroinvertebrate assemblage characteristics to develop an Index of Biotic Integrity (IBI) for semipermanent and permanent wetlands of Iowa's Des Moines Lobe ecoregion. Macroinvertebrate assemblages will be sampled from 30 wetlands that appear to range from minimally impacted to severely degraded by human influence. Statistical analysis will be used to identify macroinvertebrate assemblage characteristics that are strongly related to physical and chemical indicators, and other biological indicators, of wetland ecosystem health. Approximately 8-12 assemblage characteristics that reflect ecosystem health will be selected as IBI metrics. Last, scores from metrics will be summed to produce an IBI that provides a single quantitative measure of overall wetland ecosystem health.

This IBI will facilitate protection and restoration of Iowa wetlands by summarizing complex ecological information in the form of a single quantitative measure of ecosystem health that can be easily interpreted by and communicated to managers and the public. Additionally, an IBI will make it possible to objectively assess temporal variation in wetland condition that reflects short- or long-term environmental change. Finally, although this IBI will be developed for depressional wetlands in the Des Moines Lobe ecoregion, results from this study will provide baseline information for IBI development in other wetland ecosystems and ecoregions.

Work Products include

- Reports
  - Progress report (May 2007)
  - Final report (May 2008)
- A macroinvertebrate-based Index of Biotic Integrity for semipermanent and permanent depressional wetlands of the Des Moines Lobe ecoregion of Iowa (included in final report)
  - Metrics identified and described
  - Descriptions of rejected metrics that proved insensitive to environmental degradation (included to help future investigators avoid directing time, effort, and funds to investigating the validity of these metrics)
  - Standard Operating Procedures (SOPs) described
  - A complete list of macroinvertebrate taxon densities from wetlands included in the study.

Funding for this contract comes from the Environment First Infrastructure Funds.

Mary Skopec, Supervisor
Water Monitoring Section, IGSLQ Bureau
Environmental Services Division

6/2/06

Category/ Description	Summer 2006 (DNR)	Summer 2006 (ISU)	Academic Year 2006-07 (DNR)	Academic Year 2006-07 (ISU)	Summer 2007 (DNR)	Summer 2007 (ISU)	Academic Year 2007-08 (DNR)	Academic Year 2007-08 (ISU)	**Total cost**	**Total DNR cost**
Salaries (3% annual increase)										
M.Sc. Student Stipend	4375		6563	6563	4506		6760	6760	35527	22204
Undergraduate Assistant ($9 per hour X 12 weeks X 40 hours per week)		4320				4450			8770	0
Principal Investigator (Stewart) salary (15% of professional effort directed to project)				9300				9579	18879	0
Fringe Benefits										
M.Sc. Student (11.5% of salary)	503		755	755	518		777	777	4086	2553
Undergraduate Assistant (12% of salary)		518				534			1052	0
Principal Investigator (26.6% of salary)				2474				2548	5022	0
Travel										
To field sites (0.285 per mile X 3,000 miles + lodging X $100 per night X 15 nights)	1177				1177				2354	2354
To professional conferences				1200				1200	2400	0
M.Sc. Student Tuition	413	413	1484	1484	436	436	1568	1568	7802	3901
Supplies/Materials**	500	782			500	783			2565	1000
Total Direct Cost	6968	6033	8802	21776	7137	6203	9105	22432	88456	32012
Indirect Cost***	524		585		536		603		2249	2249
Total Project Cost	7493	6033	9387	21776	7673	6203	9708	22432	**90705**	**34261**

Analyzed Regularly from Mixing Zone Integrated Samples	Depth Profiles Analyzed 3-times each Summer
Chlorophyll (chemical)	Temperature
Phytoplankton Composition	Field pH
Zooplankton Composition	Dissolved O_2
Secchi Disk Transparency	Specific Conductivity
Total P	Turbidity
Dissolved P	
$NO_2 + NO_3$	
NH_4	
Unionized NH_3	
Total N	
Alkalinity	
Lab pH	
Dissolved Organic Carbon	
Microcystins	
Total Suspended Solids	
Inorganic Suspended Solids	
Volatile Suspended Solids	
Particle Size Distribution	

Chemical and physical	Biotic
Dissolved Oxygen % Saturation	Phytoplankton Taxonomic Richness
pH Deflection	Zooplankton Taxonomic Richness
TN :TP Ratio	Cyanobacterial Dominance
Carlson Trophic State Index	Dominance of other planktonic groups
Carbon Balance including role as sink or source of atmospheric CO_2	Large filter-feeder biomass
Percentile Rank for all relevant values, as compared to all other Iowa lakes	Numerical abundance of zooplankton for fisheries analyses
Hypsographic representation of profile data	
Average size of suspended particles	
Fractions of habitable area and volume from combined hypsography and oxygen profiles	

Lakes to be sampled at higher frequency during the summer of 2005.

Lake	Sampled by ISU	Sampled by CLAMP
Avenue of the Saints	9-times	
Bob White Lake	9-times	
Lake Darling	9-times	
Little Wall	9-times	
Nine Eagles	9-times	
Ottumwa Central Park Ponds	9-times	
Rathbun	9-times	
South Prairie	9-times	
Upper Pine	9-times	
Volga Lake	9-times	
Big Spirit Lake		11-times
Center Lake		11-times
East Okoboji Lake		11-times
Elk Lake		11-times
Lake Minnewashta		11-times
Little Spirit Lake		11-times
Lower Gar Lake		11-times
Silver Lake		11-times
Turnbull Lake		11-times
Upper Gar Lake		11-times
West Okoboji Lake		11-times

Lakes to be sampled at multiple sites to determine sampling site numbers needed to yield specified levels of precision on estimates of water quality parameters.

Lake	Sampled by ISU	Sampled by CLAMP
Black Hawk Lake	3 sites	
Browns Lake	3 sites	
Brushy Creek Lake	3 sites	
East Okoboji Lake	3 sites	5 sites
Green Valley Lake	3 sites	
Lake Anita	3 sites	
Prairie Rose Lake	3 sites	
Viking Lake	3 sites	
Hawthorne Lake	3 sites	
Hickory Grove Lake	3 sites	
Lake Ahquabi	3 sites	
Red Haw Lake	3 sites	
Lake Macbride	3 sites	
Pleasant Creek Lake	3 sites	
Big Spirit Lake		5 sites
Center Lake		2 sites
Little Spirit Lake		2 sites
Silver Lake		4 sites
West Okoboji Lake		6 sites